

Oct. 2, 1923.

1,469,439

H. P. LIVERSIDGE
FUSE BOX CONSTRUCTION

Filed Sept. 26, 1918

2 Sheets-Sheet 1

FIG. 1.

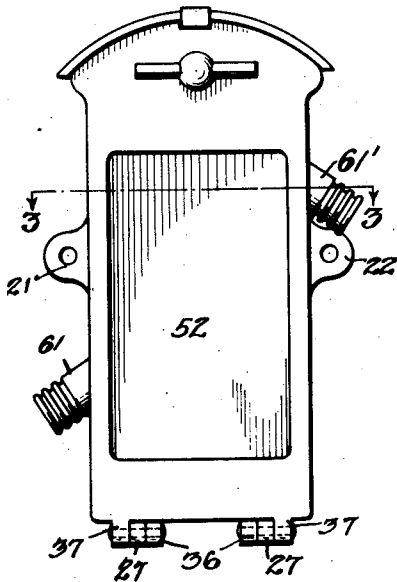


FIG. 2.

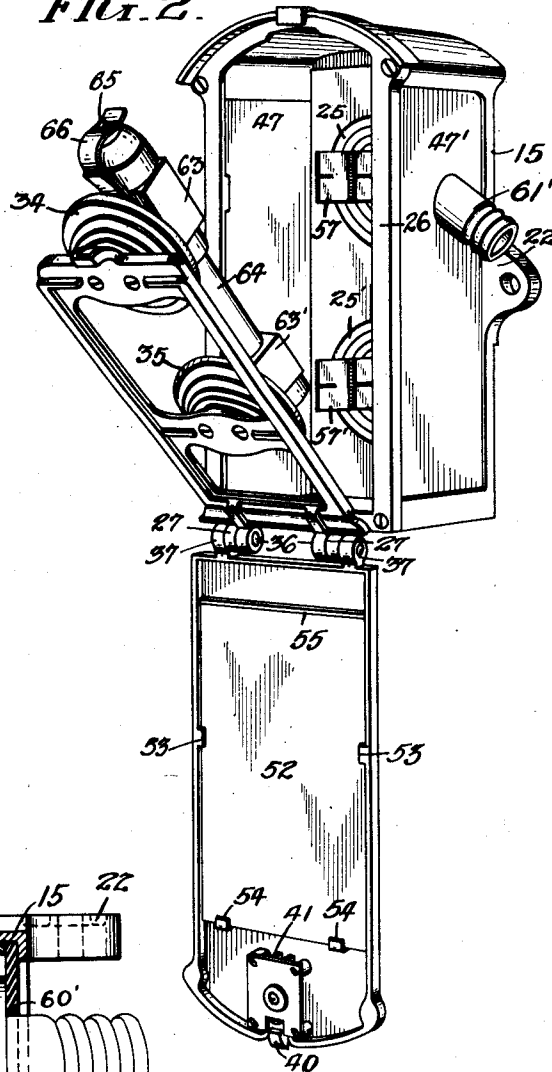
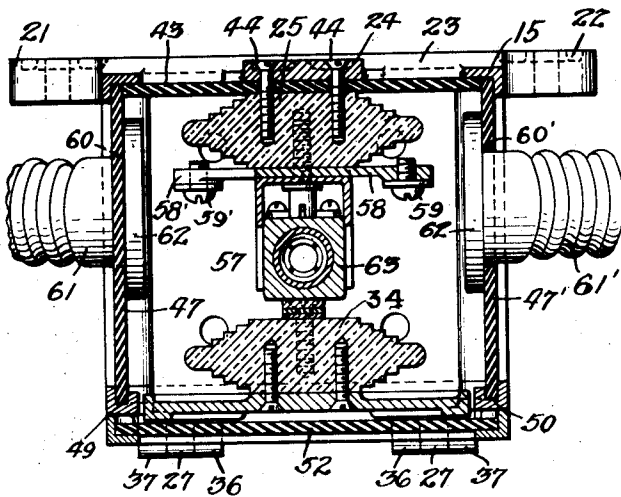


FIG. 3.



INVENTOR

HORACE P. LIVERSIDGE

BY *Wm. Steel Jackson*

ATTORNEY

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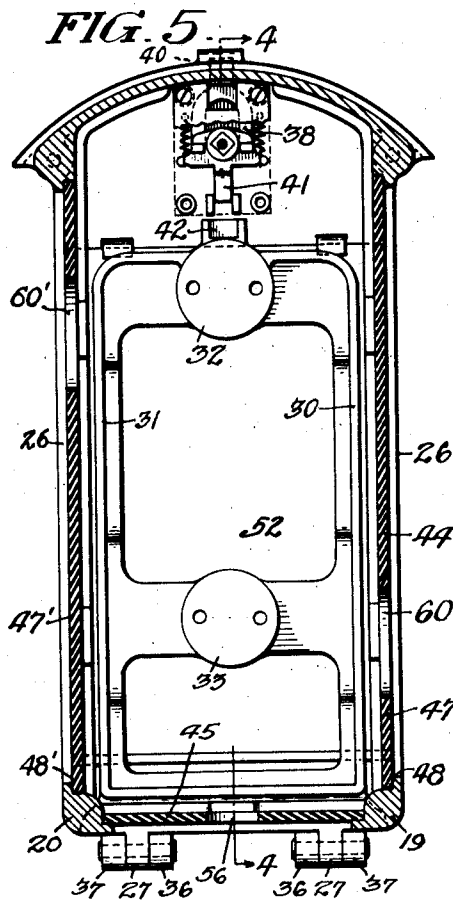
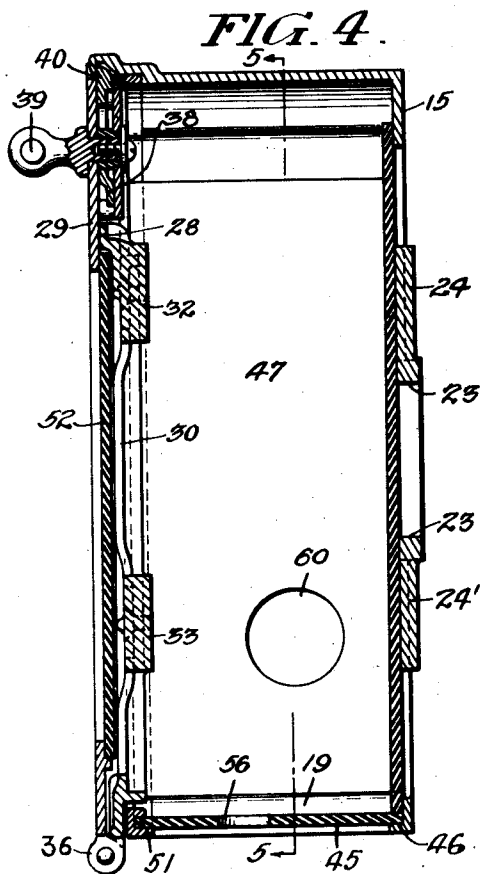


FIG. 6. FIG. 7. FIG. 8. FIG. 9. FIG. 10.

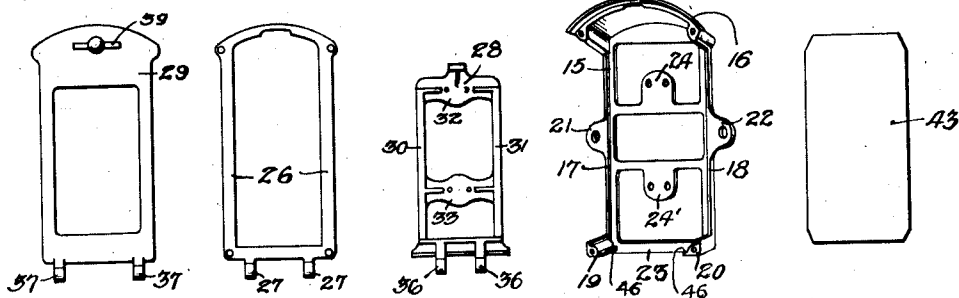
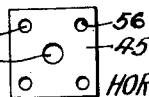
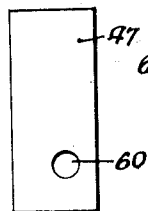
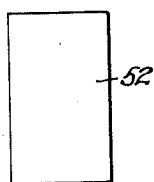


FIG. 12 FIG. 13. FIG. 14.

FIG. 11.



INVENTOR

HORACE P. LIVERSIDGE

BY *Wm. Steel Jackson*
ATTORNEY

UNITED STATES PATENT OFFICE.

HORACE P. LIVERSIDGE, OF BALA, PENNSYLVANIA.

FUSE-BOX CONSTRUCTION.

Application filed September 26, 1918. Serial No. 255,771.

To all whom it may concern:

Be it known that I, HORACE P. LIVERSIDGE, a citizen of the United States, residing at 127 Birch Avenue, Bala, in the county of Montgomery and State of Pennsylvania, have invented a certain new and useful Fuse-Box Construction, of which the following is a specification.

My invention relates to boxes intended to contain and protect fuses and to protect an adjoining structure from injury caused by blowing of the fuse.

Boxes for this service are very generally used on poles and in other places of difficult accessibility. They are subject to unusual stresses from short circuits due to tremendous current overloads, lightning, etc., which stresses sometimes destroy the box. Frequently a short circuit to the metal parts of the frame takes place, usually injuring a portion of the adjoining frame structure so seriously that it must be replaced. The metal parts most subject to short circuit injury are the top and bottom of the fuse-carrying structure and the top and bottom of the frame of the box at the front. However, with the boxes in general use, it has been necessary to replace the box entirely, involving the handling of the heavy box and new outside connections.

My invention is intended to reduce the injury to a minimum, to save expense and, more particularly, to enable the box to be placed in commission quickly and safely, wherever located, so as to interfere with service as little as possible.

In the prior constructions for this purpose the boxes have been of such rigidity of construction or homogeneity of material that any injury to the box requires that the entire structure be demounted and brought down to the ground and replaced by a complete new structure. The extended loss of service time, the difficulty of handling the relatively heavy elements involved and the danger to the operator in some of the locations represented, make this very undesirable and place a large premium upon the avoidance of injury initially as far as possible, by resilient construction and substitution of replaceable parts for those injured. My invention is primarily directed to these features.

Aside from the benefits of greater speed and safety of replacement where injury has

been done there is a tremendous saving in the maintenance cost because a comparatively small number of individual parts can then be carried in stock, made up almost wholly of duplicates of a few that are most liable to damage; saving the expense and storage of the parts and, in the present times of difficulty in having the work done, representing the difference between immediate replacement and delay until a new construction can be made.

In a box for protecting fuses which shall be capable of general use it is desirable that every care should be exercised to prevent fire danger to persons and to inflammable materials outside of the box. The box must also protect mechanically against unwarranted interference by outside parties.

Though the fuse is in such cases enclosed within a protective tube possible violence of explosion, due to sudden vaporization of the fuse requires that the box itself shall form some protection from this danger.

Heretofore the attempt to protect by the box has been chiefly by the use of solid, usually metal box walls which by their strength should withstand any explosive force from within and blows from without. This has resulted in a heavy and cumbersome box of excessive cost and usually also of poor insulating quality. My aim has been to protect both from blasts within and blows from without.

With these general objects in view the purposes of my invention are, to build up the box in readily replaceable sections upon a base to which the outside connections may be made and which ordinarily need not be disturbed; and to form a light skeleton metal structure with walls of resilient material, securing the requisite strength with a minimum of weight.

A further purpose is to use the resilient replaceable protective walls of the box to hold each other in place.

Further purposes will appear in the specification and in the claims thereof.

I prefer to illustrate my invention by reference to but one embodiment thereof, selecting one which has in use proved to be practical, highly efficient and inexpensive and which at the same time well illustrates the principles of my invention.

Figure 1 is a front elevation of the preferred form of my invention.

Figure 2 is a perspective view of the same with the parts in opened position.

Figure 3 is a section of Figure 1 taken upon line 3-3.

Figures 4 and 5 are sections taken upon lines 4-4 of Figure 5 and 5-5 of Figure 4 respectively.

Figures 6, 7, 8, 10, 11, 12, 13 and 14 are front elevations of parts of the box shown in my preferred form.

Figure 9 is a perspective view of the main frame structure of the box.

Similar numerals indicate like parts in the drawings—

The skeleton frame of the box illustrated is intended to be made of metal and comprises the parts shown in Figures 6 to 9 of which the member shown in Figure 8 is used for a special form of accessible fuse mounting claimed by me in my application for mount for fuses in fuse boxes, Serial No. 255,772, filed September 26, 1918, and co-pending herewith.

The supporting member, here the back of the box, intended for more or less permanent mounting, and to which the other parts are attached, is shown at 15.

The cover 16 is connected with it and the two may be integral. In the form shown it carries the side strips 17, 18 and the bottom and rear side strips 19 and 20. It is mounted by laterally projecting supporting ears 21 and 22. The bottom of the back frame is formed by a bar 23 and cross-pieces 24 and 24' at the back provide for support of insulators 25 and 25' (Figure 2).

The front of the skeleton frame is bordered by an edging 26 (Figure 7) rigidly secured by screws to the member 15 and carrying ears 27 as hinge supports for the skeleton fuse carrier 28 (Figure 8) and the outer door 29 (Figure 6). The carrier has sides 30, 31 and transverse insulator supports 32 and 33 for insulators 34 and 35 upon which the fuse is secured. The carrier and door are provided with ears 36 and 37 cooperating with fixed ears 27 to provide hinge connections by which the carrier or door and carrier may be swung about a convenient part of the frame to open the front and withdraw the fuse.

As best seen in Figure 5, the upper part of the door 29 is provided with a latch 38 operated by a handle 39 and so arranged that turning of the handle throws the upper bolt 40 free from its engagement with the roof of the box, releasing both the frame door and the carrier, and that further turning of the handle throws the bolt 41 at the lower part of the latch into engagement with the lug 42 on frame member 28.

Partial turning of the handle therefore, releases both the skeleton frame 28 and door 29. The latter may then be opened freely. However, the skeleton frame 28 will be held

in place by the fuse which it carries and will remain in closed position unless the handle be turned far enough for the inner bolt to engage the skeleton swinging frame and positively operate it.

In the best form of my invention the walls of the box are formed of resilient sheets forming removable panels of non-inflammable or slow burning material such as asbestos sheets or chemically treated or coated board or paper. The material may also advantageously be heat insulating and electrical insulating.

The walls are not only light and inexpensive but have sufficient resilience to yield to the explosions due to fuse vaporization without giving way wholly and without being injured, and yet protect against injury of surrounding structure.

I find asbestos board very satisfactory and show the various shapes for one of the boxes as manufactured in Figures 10-14, though it will be obvious that the shapes for the walls will differ greatly for different constructions.

The back panel 43 may be inserted first and is held in place by the insulators 25, 25' and screws 44 passing through cross pieces 24, 24'. It is preferably so placed as to leave room below for the bottom 45, which rests on flange 46, and at the sides for the side panels 47, 47' which rest against the outer flanges 48, 48'. The bottom and sides are, therefore, supported against outward movement by the flanges and against inward movement by the back.

The edging 26 is then put into position so as to retain the sides and bottom within grooves 49, 50 and 51 so that the bottom and sides are held against movement at the front also.

The panel 52 is slid in from the bottom beneath lugs 53 at the sides and 54 at the end, and is sprung into place above the rib 55, by which downward movement is subsequently prevented.

Though the cushioning effect of the resilient walls is highly advantageous and greatly reduces the danger of bursting of the box and the tendency to force gas out of the box when explosion of a fuse takes place, it may still be desirable to vent the box when a fuse is used which is open at the end, as is the case with the one illustrated. The venting will then be in line with the fuse, as by holes 56 in the bottom. When the fuse is wholly enclosed the box will usually not be vented.

The design and intended use will determine whether it be considered permissible or expedient to vent the box at all.

In the illustration I show the box as carrying a fuse which is used to act as a knife switch and which may be inspected without shift of the fuse position by opening

the front door, or in which the fuse may also be withdrawn for inspection or replacement if desired.

Upon insulators 25 and 25' are mounted
 5 pairs of contact clips 57 and 57' in electrical contact with connecting strips 58 and 58' whose binding screws 59 and 59' engage conductors not shown by means of which the fuse is connected with the circuit
 10 in which it is to be inserted. The conductors are intended to pass through the walls of the box at convenient points. For this purpose I show openings 60 and 60' within which rest insulators 61 and 61' provided
 15 with flanges 62 by which they are retained within the openings.

With these contact clips engage the electrical contacts 63 and 63' of a fuse holder 64 when the carrier 28 is in closed position
 20 so that the holder carried thereby is effective as the knife of a knife switch. The holder is mounted rigidly upon the insulators 34 and 35 through pin or hook and eye connection not shown at one end of the fuse
 25 with a support upon one insulator and the engagement at 66 of a pin upon the other end of the holder with a spring clip upon the other insulator. When the spring clip is released the fuse holder can be swung
 30 slightly to release from the eye but in the position shown is rigidly secured at both ends to insulators upon the carrier.

In operation the fuse holder is placed in position upon the insulators and is either
 35 thrown into contact with the clips by separate closing of the carrier or by movement of the carrier and door together.

The door may be opened by partial turning of the handle without affecting the fuse carrier and without disturbing the holder contact, as when inspection merely is desired or the latch may be thrown far enough to engage the rear end of the latch with the carrier so that opening movement of the
 40 door will pull the fuse carrier to some such position as that seen in Figure 2 which is the preferred limit of this movement. The door member may, however, move further as seen in this figure to give a complete view
 45 of the inside of the box, for inspection, removal or replacement of the fuse.

It is to be noted also that in the preferred construction the back skeleton structure and the rear wall are comparatively rigidly attached and form a foundation unlikely to
 50 yield to pressure and further removed from danger of arc injury than the rest of the box structure so that the foundation remains unaffected. Unless the side wall is injured
 55 the connections with the outside wiring need not ordinarily be disturbed.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

65 1. In a fuse box, a back piece adapted to

form a support for the box, in combination with a back panel therefor, removable side and front parts adapted to be connected with the back piece without removal of the back
 70 piece, separate insulators at the front and back, the back insulators holding the back panel in place and contacts carried by the insulators.

2. In a fuse box, a skeleton supporting back piece adapted to mount the box and rigidly carrying horizontal side edges in combination with a removable skeleton front
 75 piece and panels adapted to fill in the skeleton parts.

3. A fuse box comprising a plurality of interfitting renewable skeleton metallic members, one of which carries edges for mounting others therein, non-metallic panels adapted to be fitted together to form a complete box and fuse connections within the
 80 box,

4. In a fuse box, a back piece adapted to serve as a mount and rigidly carrying side edges in combination with removable skeleton structure completing a skeleton box
 85 structure, panels filling in the skeleton structure and fuse mounting within the box,

5. In a fuse box, a skeleton metal frame in combination with resilient fire-resistive walls completing the box and insulators within the box assisting in holding the parts together.

6. In a fuse box, a rigid skeleton frame in combination with insertible walls completing the box of fire resistive non-metallic material, fuse connections located within the box and in part mounted upon these walls.

7. In a fuse box, a skeleton frame in combination with resilient slow burning insertible sides and inlet and outlet insulators supported by the sides.

8. In a fuse box, a skeleton frame, a rear wall in said frame, insulators holding the rear wall in position, resilient sides for said frame and insulators supported by the
 110 sides.

9. In a fuse box, a skeleton frame in combination with resilient fire resistive walls interfitting to retain one or more of the walls by one or more of the other walls.

10. In a fuse box, a skeleton frame, resilient fire-resistive walls therefor, fitting into the frame, two opposite walls being held from collapse inwardly by one of the intermediate walls and a fuse and connections within the box.

11. In a fuse box, a skeleton frame in combination with removable back and side walls, the side walls being held against inward collapse by the back wall and an insulator and connections holding the back wall against the back part of the skeleton frame.

12. In a fuse box, a skeleton frame in combination with a resilient non-inflammable bottom wall fitting a recess in the skeleton
 120

- frame at the front end, a resilient non-inflammable back wall fitting over the bottom wall and preventing upward movement of said bottom wall, connections from the back
- 5 frame member to the back wall holding it in position and side walls resting in recesses within the skeleton frame along their front edges and retained against lateral movement by engagement with the back wall.
- 10 13. In a fuse box, a skeleton frame, in combination with resilient panels fitting in said frame, insulating inlets and outlets supported upon the resilient panels.
14. In a fuse box, a skeleton frame having
- 15 a back piece, a top and rigid edges forming the sides and bottom thereof, a skeleton front therefor and resilient non-inflammable panels to fill in the skeleton and complete the box closure and a fuse and fuse mounts within the box whereby the effect 20 of fuse explosion is relieved by the yielding of the resilient walls.
15. In a fuse box, the combination of a skeleton frame and resilient removable panels maintaining contact with the frame 25 about their edges and completing the box, with insulators and a fuse mounted thereon of a type likely to explode in use.

HORACE P. LIVERSIDGE.